



# Seminar@ISM

organized by  
Communications Group



**CNR**  
Istituto di Struttura  
della Materia

## When?

September 30, 2024  
03:00PM (CET)

## Where?

@ Aula IB09  
Area di Ricerca -  
CNR Tor Vergata  
Rome

@Social CNR-ISM



**Energy & Environment**

# 30

September 2024

## **Dmitri R. Yakovlev**

Experimental Physics 2  
TU Dortmund  
Germany

## ***Spin physics in lead halide perovskite crystals and nanocrystals***

*We provide a survey of our experimental studies of coherent spin dynamics of electrons and holes in lead halide perovskite semiconductors: bulk crystals [1-3], nanocrystals [4-5] and 2D structures [6]. Time-resolved Faraday/Kerr rotation techniques was used for that, measurements were performed at cryogenic temperatures and in strong magnetic fields. We measure spin relaxation and spin coherence times, evaluate electron and hole Lande g-factors for a representative set of perovskites with the band gap energy varying from 1.5 to 3.2 eV. We establish universal trends for the g-factors on the band gap energy in bulk materials and show that they are modified by the quantum confinement in perovskite nanocrystals. Strong interaction of hole spins with nuclear spins is found, which is considerably stronger than the one for the electron. Optically detected nuclear magnetic resonance highlights the dominating role of Pb ions in interaction with electrons and holes. Spin mode locking effect based on spin synchronization under periodic laser excitation is found in nanocrystals in glass. Experimental approaches of spin physics give reach information about these materials.*

**Info at**

**[www.ism.cnr.it/seminar-ism](http://www.ism.cnr.it/seminar-ism)**

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